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High Rates of Diabetes and Hypertension amongst Non-Latinx African-American Women as risk Factors for Low Birth Weight ; Contributing Causes and Potential Solutions.

Introduction:

The World Health Organization currently defines low birth weight (LBW) as being 5.5 lbs (2500g) at the time of birth (2014). Not only does the African American community experience some of the highest rates of LBW, it also experiences some of the highest rates of life event stressors, and chronic disease (Zhao, Kershaw, et al., 2015). Diabetes and hypertension are two chronic diseases that are potential risk factors for LBW. It is critical that the relationship between diabetes, hypertension, low birth weight, and the African American community be assessed. Life event stressors can cause the need to find ways to cope with the physical and psychological impact of stress. The use of tobacco is a method of coping with stress that can act as a potential risk factor for LBW. Due to this, it is also important that the relationship between the use of tobacco during the first trimester of pregnancy and LBW will also be evaluated.

Background:

Diabetes Mellitus (DM), refers to a category of diseases in which there is too much glucose in the bloodstream. The subcategories of DM include Type 1 (T1DM), Type 2 (T2DM), and Gestational (GDM). The prevalence of T1DM has steadily increased over the last decade (Dabelea et. al, 2014). T1DM condition occurs when the pancreas does not produce the correct

amount of insulin. It is typically associated with juvenile onset and can be managed by medication, proper nutrition, and a healthy lifestyle. T2DM, is currently the most common form of diabetes and is one of the major causes of morbidity and mortality (Hupfeld, Courtney, & Olefsky, 2016). T2DM is the result of the body not metabolizing glucose correctly. Typically this indicates that the body is not producing enough insulin or resists insulin. T2DM can be partially managed by a healthy diet and exercise, but medications and insulin therapy are often required for proper management. GDM is DM that develops during pregnancy. GDM affects the way an expectant mother's cells process sugar, which leads to high levels of sugar in the bloodstream. Treatment plans for GDM include specified meal plans and exercise regimens in addition to regular blood glucose readings and insulin injections ("How to Treat Gestational Diabetes", 2014).

In this study, both T1DM and T2DM will be grouped together and compared to GDM. This is due to the fact that T1DM and T2DM exist outside of a pregnancy. GDM only occurs during the duration of a pregnancy.

According to the Center for Disease Control (2017), "Non-Hispanic blacks (9.0 per 1,000 persons) and people of hispanic origin (8.4 per 1,000 persons) had a higher age adjusted incidence [of diagnosed diabetes] compared to non-Hispanic whites". There are several risk factors that contribute to the higher levels of prevalence within the African American community. In addition to physical activity and dietary intake, smoking and sleep disorders can influence an individual's insulin sensitivity (Joseph et. al, 2017).

The experience of racism also plays a role in the prevalence of DM in the African American community. Racism increases the amount of stress an individual experiences. Harris,

Oldmeadow, et. al (2017) argue that “perceived stress is a strong risk factor for type 2 diabetes”. Due to the fact that the African American community faces high levels of racism, it is likely that the high prevalence of DM in this community is influenced by the stress racism causes. Additionally, perceived racism amongst African American women is associated with a higher incidence of T2DM (Bacon, Struver, et. al, 2017).

Hypertension (HTN) is commonly known as high blood pressure. From 2015-2016 “hypertension prevalence was higher among non-Hispanic black (40.3%) than non-Hispanic white (27.8%), non-Hispanic Asian (25.0%), or Hispanic (27.8%) adults” (Frayer, Ostchega, et. al, 2017). This is a disease in which the force of blood against the walls of the arteries is too high. Currently, “hypertension affects approximately 1 of 3 adults in the United States, and about 2 million new cases are diagnosed each year” (Nguyen, Dominguez, et al., 2010, p.4). HTN can be the result of high sodium consumption, familial history of the disease, and chronic high stress. Stress has the potential to be a significant contributing factor. In the African American community, stress caused by perceived discrimination and living within stress-prone neighborhoods has been noted as possible contributing factors for HTN (Whelton et. al, 2016). Similarly to DM, perceived discrimination is a risk factor for HTN. There is evidence that suggests multiple forms of racism act as contributing factors in the development of HTN (Brondolo, Love, et. al, 2011).

Management of this disease typically involves lifestyle modifications or medication (Whelton et. al, 2016). Pregnancy induced hypertension or gestational hypertension refers to hypertension that only occurs during pregnancy. DM, multiple fetuses, and kidney disease all increase the risk of developing gestational hypertension. Management for gestational

hypertension can include rest, increasing water consumption, and in some cases hospitalization (Hod et. al, 2015).

The use of tobacco during the first trimester of pregnancy is an additional factor that increases the risk of a negative birth outcome (Passey et. al, 2014). Despite efforts to raise awareness regarding the dangers of smoking, “tobacco is the leading cause of preventable death in the United States” (Multnomah County Health Department, 2014). Additionally, in 2011, 21% of deaths in Multnomah County were from tobacco-related causes (Ibid). In 2014, the Black/African American community was within the “needs improvement” level according to Multnomah County’s cigarette smoking prevalence (Ibid).

Smoking cigarettes during pregnancy is particularly dangerous due to the fact that linear growth occurs rapidly in utero (Quelhas et.al, 2018). Smoking during pregnancy is associated with increased odds of an infant being Small for Gestational Age (SGA) in comparison to infants born to mothers who do not smoke (Ibid). An infant that is SGA is within the 10th percentile for birth weight (Chen & Jansson, 2017). According to the CDC, “women who stop smoking during pregnancy also reduce their risk of having a low birth weight baby” (2017). It is imperative that a mother cease smoking during her first trimester of pregnancy because children born to mothers that continued to smoke are more likely to develop asthma and reduced lung function (Prabhu et. al, 2010,).

The risks during pregnancy of hypertension and diabetes are often addressed during crucial prenatal care (PNC) appointments. Consistent prenatal care that begins during the first trimester of pregnancy increases the likelihood that an infant will be a healthy birth weight and full term delivery (US Department of Health and Human Services, 2016). Prenatal care gives mothers the

opportunity to be assessed for potential complications which is beneficial for both her and the infant (McCormick et. al, 2001). Similarly to cigarette smoking prevalence, the disparity ratio for the Black/African American community in Multnomah County fell in the “needs improvement” category for first trimester prenatal care (Multnomah County Health Department, 2014).

Socioeconomic factors also contribute to the likelihood that an infant will be born at a LBW. Women that have completed low levels of education are more likely to experience adverse birth outcomes, including LBW, than women that complete high levels of education (Tooth and Mishra, 2015). Furthermore, women that have low levels of education are less likely to have access to adequate PNC. This is due to the fact that women that achieve higher levels of education are likely to have higher income household. Higher income households often have better access to proper nutrition and experience lower levels of general stress. Additionally, a woman that achieves a higher level of education is more likely to have private health insurance and is more likely to pursue consistent PNC. Overall, insurance coverage often influences a mother’s access to PNC. In fact, the use of Medicaid acts as a “marker for factors that may increase infant mortality” (Ounspraseuth et. al, 2012, p. 354) overall. Medicaid is a national service offered to several mandatory eligibility groups including low income families, women and children that meet specific qualifications, and individuals that receive Supplemental Security Income (SSI) (Centers for Medicaid and Medicare Services, n.d).

Significance:

Research has shown that African Americans are more likely to develop HTN than white Americans (Brondolo, Love, et. al, 2011). Prevalence of HTN within the African American community can “range from 30.6 to 40.5%; whereas the rates for white range from 24.4 to 29%” (imbid) in adults. Due to this disparity, it is critical that risk factors for LBW be investigated. As discussed above, both prepregnancy are potential risk factors that increase a woman’s likelihood of delivering a LBW infant.

In 2013, 13.2% of non-Hispanic black women over the age of 20 had been diagnosed with DM (Center for Disease Control, 2013). Despite not being the most likely racial group to develop GDM, African American mothers are more likely than their white counterparts to develop GDM (Hedderson, Monique M et. al, 2010). Due to the high prevalence of DM overall in the African American community, it is important to evaluate the influence it can have on LBW. Once the influence is understood, proper public health interventions can occur.

Research Questions

- This research strives to understand what is the prevalence of LBW amongst non-Latinx African American women who had GDM?
- Is this prevalence higher or lower than the prevalence of prepregnancy DM amongst non-Latinx African American women?
- Additionally, what is the prevalence of LBW and prepregnancy HTN amongst non-Latinx African American women?

- Is this prevalence higher or lower than LBW and GHTN amongst non-Latinx African American women?

Methods:

This research will utilize birth certificate data of babies born to mothers residing in Multnomah County from 2013-2017 to conduct a retrospective study. The sample included in this data will include self-identifying non-Latina African American women, which may include women who identify with more than one race. The women in the sample are between the ages of 25-39 years old. This age range was chosen because teen pregnancies will not be included in this research. . The variables that will be used in this study are as follows: level of education of the mother, the type of insurance coverage of the expectant mother, the amount of prenatal care received, and the use of tobacco. The potential levels of mother's education included: less than a high school diploma, high school diploma or GED, some college, and a college degree. The sample's insurance coverage was sorted into two categories: private insurance or Medicaid/OHP. To assess whether or not adequate prenatal care was received the sample was put in group "yes" if OPHAT indicated Adequate prenatal care was received. If OHPAT indicated that adequate prenatal care was not received they were placed in group "no". Lastly, the potential categories for weight gain during pregnancy were: Below recommended amount of weight gain for BMI, average weight gain for BMI, and below the recommended amount of weight gain for BMI. For the use of tobacco, only use during the first trimester of pregnancy was assessed. It is important

to establish these factors as the covariates for this research because they each have the potential to greatly impact birth outcomes.

Results:

The results for this study are summarized in the tables below. Table 1 is a calculation of the prevalence of LBW with each variable. Tables 2-6 are calculations of the relative risk ratio associated with pre-pregnancy DM, GDM, pre-pregnancy HTN, GHTN, and the use of tobacco during the first trimester of pregnancy.

The results shown in Table 1 indicate that women that receive some high school education or earn a GED have the highest prevalence of giving birth to a LBW infant (13.6%). Women that had earned a college degree had the second highest prevalence of LBW (13.4%). Those that had some high school completed at the time of birth had a LBW prevalence of 8.4%. In contrast, women that have completed some college prior to becoming pregnant are the least likely to give birth to a LBW infant (7.7%).

Women that did not receive adequate PNC during their pregnancy were much more likely to give birth to a LBW infant than women that did receive adequate PNC (17.2%). The accessibility to PNC is often linked to health insurance coverage. Table 1 indicates that more women in the sample had Medicaid/OHP than private insurance coverage and experienced a higher rate of LBW outcome(9.8%). Women that had private insurance fared just slightly better and had a LBW of 8.9%.

Mothers that achieved below the recommended weight gain for their BMI during their pregnancy were the most likely to deliver a LBW infant (13.1%). Mothers that gained above the recommended amount of weight for their BMI were the least likely to deliver a LBW infant(9.1%). Lastly, women that gained more than the recommended amount of weight for their BMI had a LBW prevalence of 8.0%. This result was not surprising due to the fact that it is likely that if a mother is not gaining enough weight, the infant will not achieve their projected growth rate.

Table 2 indicates an increased incidence of LBW among women that have prepregnancy DM than those that do not (7.3%). Similarly, Table 3 shows that the incidence rate of LBW among women that have GDM is higher than those that do not develop GDM (11.9)

The results of Table 4 display an increased incidence of LBW for women that have prepregnancy HTN than those that do not (12.3%). Table 5 reflects an increased incidence of LBW among women that develop GHTN than those that do not (12.5)

Lastly, the results of Table 6 prove that an increased incidence of 12.9% exists among women that smoke during the first trimester of pregnancy than those that do not use tobacco during this stage of their pregnancy.

Table 1

Population	Total (N)	% of Total	LBW(N)	LBW %
Total	2448		237	9.7%
Mothers Education				

Less Than High School Diploma	463	18.9%	39	8.4%
High School Diploma or GED	551	22.5%	75	13.6%
Some College	772	31.5%	60	7.7%
College Degree	452	18.4%	61	13.4%
Adequate Prenatal Care Received				
Yes	2142	87.5%	186	8.6%
No	255	10.4%	44	17.2%
Insurance				
Medicaid/OHP	1609	65.7%	159	9.8%
Private Insurance	790	32.2%	71	8.9%
Pregnancy Weight Gain				
Below Recommended Weight Gain for BMI	576	25.6%	76	13.1%
Recommended Weight Gain for BMI	642	26.2%	59	9.1%
Above Recommended Weight Gain for BMI	1165	47.5%	94	8.0%

Table 2

	LBW	Not LBW	Total
Pre-pregnancy DM	11	155	166
No pre-pregnancy DM	226	2056	2282
Totals	237	2211	2448

Relative Risk: 7.3%

Table 3

	LBW	Not LBW	Total
GDM	24	237	261
No GDM	213	1974	2187

Totals	237	2211	2448
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Relative Risk: 11.9%

Table 4

	LBW	Not LBW	Total
HTN	31	237	268
No HTN	206	1974	2180
Total	237	2211	2448

Relative Risk: 12.3%

Table 5

	LBW	Not LBW	Total
GHTN	35	237	272
No GHTN	202	1974	2176
Total	237	2211	2448

Relative Risk: 12.5%

Table 6

	LBW	Not LBW	Total
Tobacco Use During the First Trimester	45	235	280
No Tobacco Use During the First Trimester	192	1976	2169
Total	237	2211	2448

Relative Risk 12.9%

Discussion

This study analyzed the relationship between non-Latinx African American women and DM, HTN, and LBW. There are numerous factors that contribute to an infant being LBW including: education of the mother, whether or not adequate PNC was received, insurance

coverage of the mother, the amount of weight the mother gained during pregnancy, the presence of pre-pregnancy DM, GDM, pre-pregnancy HTN, GHTN, and the use of tobacco during the first trimester of pregnancy.

Due to the complex nature of LBW, it is vital that all these factors be analyzed when assessing the prevalence of LBW in the non-latinx African-American community. It is highly probable that these factors act as cofounders for the development in GDM and GHTN. Thus, they are directly connected to the prevalence of LBW.

DM and HTN are both highly prevalent in the African American community. High levels of stress, perceived experiences of racism, and modifiable lifestyle risks are theorized to be the largest contributing factors to the prevalence of DM and HTN in this community. Due to the fact that these factors typically continue throughout the duration of a pregnancy, it is not surprising this community also has a high prevalence of GDM and GHTN.

The results of this study indicate that both GDM and GHTN contribute to the prevalence of LBW in this community. It is important that proper management of these conditions begin prior to a pregnancy and continue throughout the duration of the pregnancy. Early detection of GDM and GHTN increase the likelihood of proper management and thus help decrease the likelihood that a pregnancy will result in a poor birth outcome overall.

Additionally, there is a need for public health intervention to begin prior to the development of these conditions. Public health interventions that are designed to reduce the prevalence of DM and HTN would be the most beneficial for reducing the prevalence of LBW amongst Non-Latinx African American women. Due to the fact that utilizing preventive medicine perspective in health care has proven to be highly beneficial, the African American

community would highly benefit from this approach. Preventative medicine strives to address health concerns prior to the development of disease.

Preventative medicine would address the rates of LBW that occur among women that do not receive adequate PNC. Encouraging patients to regularly attend doctor's visits would give patients the opportunity to discuss abnormalities that may be occurring during their pregnancy. Additionally, regular doctor's appointments would allow medical professionals to track the expectant mother's weight. If concerns about weight gain occur, they can be immediately addressed to reduce the likelihood that the infant will be LBW. Tobacco use during the first trimester is also a factor that can be addressed through adequate PNC. Medical professionals can properly educate patients about the potential dangers of smoking while pregnant.

The results of this research also indicate that women with a high school diploma or GED are the most likely to give birth to a LBW infant. It is likely that this is due to the lack of socioeconomic opportunity afforded to those that do not have any higher levels of education. It is also likely that stress that results from the lack of socioeconomic opportunity contributes to the occurrence of LBW within this demographic. To address this, more opportunities need to be made available for non-Latinx African American women to pursue a higher education. By addressing education level, health insurance coverage and subsequently adequate PNC as risk factors will also be addressed.

Perceived experiences of racism can be difficult to address. However, increasing the diversity of medical professionals would be highly beneficial. While women will still be experiencing stress from perceived racism outside of a medical setting, increasing the diversity among medical staff will help alleviate instances of racism from medical providers.

There are several limitations to this study. This research does not take into account the role epigenetics play in the likelihood of LBW. Additionally, this study does not consider the impact of weathering on an expectant mother and the ways in which that can influence birth outcomes. Lastly, There is also a need for further research that includes a large sample size.

Conclusion

LBW is highly prevalent among non-Latinx African American women. This study has shown that DM, GDM, HTN, and GHTN increase the likelihood that a pregnancy will result in a LBW infant. In order to fully comprehend the high prevalence of DM, HTN, and LBW in the African American community additional contributing factors must be considered. Contributing factors such as adequate PNC, the amount of weight a woman gained during pregnancy, and the use of tobacco during the first trimester of pregnancy can also be addressed through public health intervention.

However, there are other contributing factors that must be addressed through a different approach. While education is important, the prolonged exposure to racism in the education system contributes to the weathering effect. The weathering effect refers to the biological impact of racism and sexism on the body. It is likely that the weathering effect is responsible for the high rate of LBW among women with a college degree.

The weathering effect is merely one way in which racism impacts the health of African Americans. Stress that results from perceived racism is a high risk factor for chronic diseases and

LBW. It is important that steps are taken to create public health interventions that assist with stress management.

LBW in the African American community will not be solved through a single pronged effort. A multifaceted approach is required to address the high prevalence of DM, GDM, HTN, GHTN, and LBW.

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